# Theorems

**2.1 Properties of Segment Congruence** Segment congruence is reflexive, symmetric, and transitive.

**Reflexive:** For any segment $AB$, $\overline{AB} \cong \overline{AB}$.

**Symmetric:** If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$.

**Transitive:** If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$. ***(p. 113)***

**2.2 Properties of Angles Congruence** Angle congruence is reflexive, symmetric, and transitive.

**Reflexive:** For any angle $A$, $\angle A \cong \angle A$.

**Symmetric:** If $\angle A \cong \angle B$, then $\angle B \cong \angle A$.

**Transitive:** If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$. ***(p. 113)***

**2.3 Right Angles Congruence Theorem** All right angles are congruent. ***(p. 124)***

**2.4 Congruent Supplements Theorem** If two angles are supplementary to the same angle (or to congruent angles), then the two angles are congruent. ***(p. 125)***

**2.5 Congruent Complements Theorem** If two angles are complementary to the same angle (or to congruent angles), then the two angles are congruent. ***(p. 125)***

**2.6 Vertical Angles Congruence Theorem** Vertical angles are congruent. ***(p. 126)***

**3.1 Alternate Interior Angles Theorem** If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent. ***(p. 155)***

**3.2 Alternate Exterior Angles Theorem** If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent. ***(p. 155)***

**3.3 Consecutive Interior Angles Theorem** If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary. ***(p. 155)***

**3.4 Alternate Interior Angles Converse** If two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel. ***(p. 162)***

**3.5 Alternate Exterior Angles Converse** If two lines are cut by a transversal so the alternate exterior angles are congruent, then the lines are parallel. ***(p. 162)***

**3.6 Consecutive Interior Angles Converse** If two lines are cut by a transversal so the consecutive interior angles are supplementary, then the lines are parallel. ***(p. 162)***

**3.7 Transitive Property of Parallel Lines** If two lines are parallel to the same line, then they are parallel to each other. ***(p. 164)***

**3.8** If two lines intersect to form a linear pair of congruent angles, then the lines are perpendicular. ***(p. 190)***

**3.9** If two lines are perpendicular, then they intersect to form four right angles. ***(p. 190)***

**3.10** If two sides of two adjacent acute angles are perpendicular, then the angles are complementary. ***(p. 191)***

**3.11 Perpendicular Transversal Theorem** If a transversal is perpendicular to one of two parallel lines, then it is perpendicular to the other. ***(p. 192)***

**3.12 Lines Perpendicular to a Transversal Theorem** In a plane, if two lines are perpendicular to the same line, then they are parallel to each other. ***(p. 192)***

**4.1 Triangle Sum Theorem** The sum of the measures of the interior angles of a triangle is $180°$. ***(p. 218)***

**Corollary** The acute angles of a right triangle are complementary. ***(p. 220)***

**4.2 Exterior Angle Theorem** The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles. ***(p. 219)***

**4.3 Third Angles Theorem** If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent. ***(p. 227)***

**4.4 Properties of Triangle Congruence** Triangle congruence is reflexive, symmetric, and transitive.

**Reflexive:** For any $\triangle ABC$, $\triangle ABC \cong \triangle ABC$.

**Symmetric:** If $\triangle ABC \cong \triangle DEF$, then $\triangle DEF \cong \triangle ABC$.

**Transitive:** If $\triangle ABC \cong \triangle DEF$ and $\triangle DEF \cong \triangle JKL$, then $\triangle ABC \cong \triangle JKL$. ***(p. 228)***